WHAT IS CLAIMED IS:

1. A thermal interface material for bonding components of electronic devices, the thermal interface material comprising:

a solder component comprising a bonding component selected from the group consisting of In, an In-Sn alloy, a Au-Sn alloy, a Bi alloy, and mixtures thereof; and

an additive component selected from among i) a CTE modifying component having a coefficient of thermal expansion that is less than about 10 μm/m°C, ii) a thermal conductivity enhancement component having a thermal conductivity that is at least about 100 W/mK, and iii) combinations thereof.

2. The thermal interface material of claim 1 further comprising an intrinsic oxygen getter selected from the group consisting of rare earth metals, alkali metals, alkaline-earth metals, refractory metals, Zn, and mixtures and alloys thereof.

3 . The thermal interface material of claim 1 further comprising an intrinsic oxygen getter selected from the group consisting of Li, Na, K, Mg, Ca, Ti, Zr, Hf, Ta, V, Nb, La, Ce, Pr, Sm, Nd, Eu, Gd, Tb, Dy, Yb, and mixtures and alloys thereof.

4. The thermal interface material of claim 1 comprising the thermal conductivity enhancement component wherein the thermal conductivity enhancement component is a component selected from the group consisting of Al, Ag, Cu, Al-coated

Cu, Au, AlN, BeO, BN, high conductivity cermets, cuprates, silicides, carbon phases, and mixtures thereof.

5. The thermal interface material of claim 1 comprising, as the bonding component, Au and a second metal selected from the group consisting of Sn, Si, Ge, and mixtures and alloys thereof.

6. The thermal interface material of claim 1 wherein the solder component wets metallic and non-metallic surfaces without extrinsic fluxing, the solder component comprising a bonding component selected from the group consisting of In and In-Sn alloys, and further comprising an intrinsic oxygen getter selected from the group consisting of alkali metals, alkaline-earth metals, refractory metals, rare earth metals, Zn, and mixtures and alloys thereof.

7. The thermal interface material of claim 1 wherein the additive component is uncoated.

8. The thermal interface material of claim 1 comprising a multilayer solder preform structure wherein the solder component constitutes a first layer comprising the bonding component filled with the additive component, and wherein the first layer is interposed between a second layer and a third layer, wherein the second and third layers comprise solder metal selected from the group consisting of Sn, Cu, In, Pb, Sb, Au, Ag, alloys thereof, Bi alloys, and mixtures thereof.

9. The thermal interface material of claim 8 wherein the first layer has a thickness between about 0.001 inch(0.025 mm) and about 0.125 inch (3 mm), and second and third layers each have a thickness between about 0.0001 inch (0.0025 mm) and about 0.02 inch (0.5 mm).

10. The thermal interface material of claim 1 comprising a spherical solder preform comprising a sphere body and a sphere body surface layer, wherein the sphere body comprises the bonding component filled with the additive component, and wherein the sphere body surface layer comprises a layer of unfilled solder metal selected from the group consisting of Sn, Cu, In, Pb, Sb, Au, Ag, alloys thereof, Bi alloys, and mixtures thereof.

11. The thermal interface material of claim 10 wherein the sphere body has a diameter of between about 0.003 inch (0.075 mm) and about 0.06 inch (1.5 mm), and the sphere body surface layer has a thickness between about 0.0005 inch (0.0125 mm) and about 0.05 inch (1.25 mm).

12. A thermal interface material for bonding components of electronic devices, the thermal interface material comprising:

a solder component comprising a bonding component selected from the group consisting of In, Cu, Au, Sn, Pb, Sb, Ag, alloys thereof, Bi alloys, and mixtures thereof;

an additive component selected from among i) a CTE

modifying component having a coefficient of thermal expansion that is less than about 10 μm/m°C, ii) a thermal conductivity enhancement component having a thermal conductivity that is at least about 100 W/mK, and iii) combinations thereof; and

an intrinsic oxygen getter selected from the group consisting of rare earth metals, alkali metals, alkaline-earth metals, refractory metals, Zn, and mixtures and alloys thereof.

13. The thermal interface material of claim 12 wherein the additive component is uncoated.

14. The thermal interface material of claim 12 comprising a multilayer solder preform structure wherein the solder component constitutes a first layer comprising the bonding component filled with the additive component, and wherein the first layer is interposed between a second layer and a third layer, wherein the second and third layers comprise solder metal selected from the group consisting of Sn, Cu, In, Pb, Sb, Au, Ag, alloys thereof, a Bi alloy, and mixtures thereof.

15. The thermal interface material of claim 14 wherein the first layer has a thickness between about 0.001 inch (0.025 mm) and about 0.125 inch (3 mm), and second and third layers each have a thickness between about 0.0001 inch (0.0025 mm) and about 0.02 inch (0.5 mm).

16. The thermal interface material of claim 12 comprising a spherical solder preform comprising a sphere body and a sphere body surface layer, wherein the sphere body

comprises the bonding component filled with the additive component, and wherein the sphere body surface layer comprises a layer of unfilled solder selected from the group consisting of Sn, Cu, In, Pb, Sb, Au, Ag, alloys thereof, a Bi alloy, and mixtures thereof.

17. The thermal interface material of claim 16 wherein the sphere body has a diameter of between about 0.003 inch (0.075 mm) and about 0.06 inch (1.5 mm), and the sphere body surface layer has a thickness between about 0.0005 inch (0.0125 mm) and about 0.05 inch (1.25 mm).

18. An active solder that wets metallic and non-metallic surfaces without extrinsic fluxing, the active solder comprising a bonding component selected from the group consisting of In, Cu, Au, Sn, Pb, Sb, Ag, alloys thereof, Bi alloys, and mixtures thereof, and an intrinsic oxygen getter selected from the group consisting of rare earth metals, alkali metals, alkaline-earth metals, refractory metals, Zn, alloys thereof, and mixtures thereof.

19. An active solder that wets metallic and non-metallic surfaces without extrinsic fluxing, the active solder comprising a bismuth alloy bonding component, and an intrinsic oxygen getter selected from the group consisting of rare earth metals, alkali metals, alkaline-earth metals, refractory metals, Zn, alloys thereof, and mixtures thereof.

20. A multilayer solder preform for bonding components of electronic devices comprising:

a first solder preform layer having a top surface and a bottom surface and comprising a solder metal bonding component and an additive selected from among thermal conductivity enhancement components, CTE modifying components, and mixtures thereof;

a second solder metal preform layer comprising applied to the bottom surface of the first solder preform layer; and

a third solder metal preform layer applied to the top surface of the first solder preform layer.

21. The multilayer solder preform of claim 20 wherein the solder metal bonding component, the second solder metal preform layer, and the third solder metal preform layer are selected from the group consisting of Sn, Cu, In, Pb, Sb, Au, Ag, alloys thereof, a Bi alloy, and mixtures thereof.

22. The multilayer solder preform of claim 21 wherein the additive comprises a thermal conductivity enhancement component selected from among Al, Al-coated Cu, Cu, Ag, Au, and alloys thereof, AlN, BeO, BN, high conductivity cermets, cuprates, silicides, and carbon phases.

23. The multilayer solder preform of claim 21 wherein the additive comprises a thermal conductivity enhancement component which is uncoated and is selected from among Al, Cu, Ag, Au, and alloys thereof, AlN, BeO, BN, high conductivity cermets, cuprates, silicides, and carbon phases.

24. The multilayer solder preform of claim 21 wherein the additive comprises a CTE modifying component selected from the group consisting of BeO, Al_2O_3, AlN, SiC, SiO_2, low expansion Fe-Ni alloys, low expansion ceramic powders, low expansion glass powders and mixtures thereof.

25. The solder preform of claim 21 wherein the additive comprises a CTE modifying component which is uncoated and is selected from the group consisting of of BeO, Al_2O_3, AlN, SiC, SiO_2, low expansion Fe-Ni alloys, low expansion ceramic powders, low expansion glass powders, and mixtures thereof.

26. The solder preform of claim 20 wherein the solder metal bonding component, the second solder metal preform layer, and the third solder metal preform layer are selected from the group consisting of Sn, Cu, In, Pb, Sb, Au, Ag, alloys thereof, a Bi alloy, and mixtures thereof; wherein the additive comprises a thermal conductivity enhancement component selected from among Al, Al-coated Cu, Cu, Ag, Au, and alloys thereof, AlN, BeO, BN, high conductivity cermets, cuprates, silicides, and carbon phases; and wherein the additive comprises a CTE modifying component selected from the group consisting of BeO, Al_2O_3, AlN, SiC, SiO_2, low expansion Fe-Ni alloys, low expansion ceramic powders, low expansion glass powders and mixtures thereof.

27. The solder preform of claim 20 wherein the solder metal bonding component, the second solder metal preform layer, and the third solder metal preform layer are selected from the group consisting of Sn, Cu, In, Pb, Sb, Au, Ag,

alloys thereof, a Bi alloy, and mixtures thereof; wherein the additive comprises a thermal conductivity enhancement component which is uncoated and is selected from among Al, Cu, Ag, Au, and alloys thereof, AlN, BeO, BN, high conductivity cermets, cuprates, silicides, and carbon phases; and wherein the additive comprises a CTE modifying component which is uncoated and is selected from the group consisting of of BeO, Al_2O_3, AlN, SiC, SiO_2, low expansion Fe-Ni alloys, low expansion ceramic powders, low expansion glass powders, and mixtures thereof.

28. The multilayer solder preform of claim 20 wherein the first solder preform layer further comprises an intrinsic oxygen getter selected from the group consisting of rare earth metals, alkali metals, alkaline-earth metals, refractory metals, Zn, mixtures thereof, and alloys thereof.

29. The multilayer solder preform of claim 20 wherein the first layer has a thickness between about 0.001 inch (0.025 mm) and about 0.125 inch (3 mm), and the second and third layers each have a thickness between about 0.0001 inch (0.0025 mm) and about 0.02 inch (0.5 mm).

30. The multilayer solder preform of claim 22 wherein the first layer has a thickness between about 0.001 inch (0.025 mm) and about 0.125 inch (3 mm), and the second and third layers each have a thickness between about 0.0001 inch (0.0025 mm) and about 0.02 inch (0.5 mm).

31. The multilayer solder preform of claim 24 wherein the

first layer has a thickness between about 0.001 inch (0.025 mm) and about 0.125 inch (3 mm), and the second and third layers each have a thickness between about 0.0001 inch (0.0025 mm) and about 0.02 inch (0.5 mm).

32. A solder preform for bonding components of electronic devices comprising:

a sphere body comprising a sphere body solder metal bonding component and an additive component selected from among thermal conductivity enhancement components, CTE modifying components, and mixtures thereof; and

a sphere body surface layer comprising a solder metal over the sphere body.

33. The solder preform of claim 32 wherein the sphere body solder metal bonding component and the sphere body surface layer are selected from the group consisting of Sn, Cu, In, Pb, Sb, Au, Ag, alloys thereof, and Bi alloys.

34. The solder preform of claim 32 wherein the additive comprises a thermal conductivity enhancement component selected from among Al, Al-coated Cu, Cu, Ag, Au, and alloys thereof, AlN, BeO, BN, high conductivity cermets, cuprates, silicides, and carbon phases.

35. The solder preform of claim 32 wherein the additive comprises a thermal conductivity enhancement component which is uncoated and is selected from among Al, Cu, Ag, Au, and alloys thereof, AlN, BeO, BN, high conductivity cermets, cuprates, silicides, and carbon phases.

36. The solder preform of claim 32 wherein the additive comprises a CTE modifying component selected from the group consisting of BeO, Al_2O_3, AlN, SiC, SiO_2, low expansion Fe-Ni alloys, low expansion ceramic powders, low expansion glass powders and mixtures thereof.

37. The solder preform of claim 32 wherein the additive comprises a CTE modifying component which is uncoated and is selected from the group consisting of of BeO, Al_2O_3, AlN, SiC, SiO_2, low expansion Fe-Ni alloys, low expansion ceramic powders, low expansion glass powders, and mixtures thereof.

38. The solder preform of claim 32 wherein the sphere body solder metal bonding component and the sphere body surface layer are selected from the group consisting of Sn, Cu, In, Pb, Sb, Au, Ag, alloys thereof, a Bi alloy, and mixtures thereof; wherein the additive comprises a thermal conductivity enhancement component selected from among Al, Al-coated Cu, Ag, Au, and alloys thereof, AlN, BeO, BN, high conductivity cermets, cuprates, silicides, and carbon phases; and wherein the additive comprises a CTE modifying component selected from the group consisting of BeO, Al_2O_3, AlN, SiC, SiO_2, low expansion Fe-Ni alloys, low expansion ceramic powders, low expansion glass powders and mixtures thereof.

39. The solder preform of claim 32 wherein the sphere body solder metal bonding component and the sphere body surface layer are selected from the group consisting of Sn, Cu, In, Pb, Sb, Au, Ag, alloys thereof, a Bi alloy, and

mixtures thereof; wherein the additive comprises a thermal conductivity enhancement component which is uncoated and is selected from among Al, Cu, Ag, Au, and alloys thereof, AlN, BeO, BN, high conductivity cermets, cuprates, silicides, and carbon phases; and wherein the additive comprises a CTE modifying component which is uncoated and is selected from the group consisting of BeO, Al_2O_3, AlN, SiC, SiO_2, low expansion Fe-Ni alloys, low expansion ceramic powders, low expansion glass powders and mixtures thereof.

40. The solder preform of claim 32 wherein the sphere body further comprises an intrinsic oxygen getter selected from the group consisting of rare earth metals, alkali metals, alkaline-earth metals, refractory metals, Zn, mixtures thereof, and alloys thereof.

41. The solder preform of claim 32 wherein the sphere body has a diameter of between about 0.003 inch (0.075 mm) and about 0.06 inch (1.5 mm), and the sphere body surface layer has a thickness between about 0.0005 inch (0.0125 mm) and about 0.05 inch (1.25 mm).

42. The solder preform of claim 35 wherein the sphere body has a diameter of between about 0.003 inch (0.075 mm) and about 0.06 inch (1.5 mm), and the sphere body surface layer has a thickness between about 0.0005 inch (0.0125 mm) and about 0.05 inch (1.25 mm).

43. The solder preform of claim 36 wherein the sphere body has a diameter of between about 0.003 inch (0.075 mm) and

about 0.06 inch (1.5 mm), and the sphere body surface layer has a thickness between about 0.0005 inch (0.0125 mm) and about 0.05 inch (1.25 mm).